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19. Abstract. (cont)

Nine papers were published in refereed journals. Thirteen papers are either submitted to refereed journals or are under preparation. Abstracts of five papers were presented to domestic and international conferences. Dissociative attachment and polar dissociation cross sections were measured for the following molecules: HCl, NO, H₂O, C₆H₆, SiH₄, Si₂H₆, and LiH. Direct ionization and dissociative ionization cross sections were determined for the following molecules: H₂, D₂, N₂, O₂, He, Ne, Ar, Kr, Xe, H₂O, CO, CO₂, CH₄, SiH₄, SiH₄, Si₂H₆, N₂⁺, and NH₃. An experimental apparatus for a pulsed extraction technique was fabricated and successfully tested. *Keywords:*

Electron Impact Spectra; Hydrogen Chloride; Nitrogen Oxides; Nitrous Oxide; Benzene, Silane, Disilane, Lithium Hydride; Hydrogen Deuterium; Nitrogen; Oxygen; Helium; Neon; Argon, Krypton, Xenon; Water; Carbon Monoxide; Carbon Dioxide; Methane; Ammonia. (jhd)

AFOSR-TR- 89 - 1 1 0 2

FINAL REPORT

ON

**THE PROPOSAL ENTITLED" ION FORMATION BY ELECTRON IMPACT"
JPL Task plan No. 80-2501**

Period of Performance: 5/31/85 to 11/30/88

Principal Investigator: Santosh K. Srivastava

AFOSR-ISSA-85-0070
AFOSR-ISSA-86-0036
AFOSR-ISSA-87-0036
AFOSR-ISSA-88-0014

FINAL REPORT ON THE PROPOSAL ENTITLED "ION FORMATION BY ELECTRON IMPACT"

Principal Investigator: Santosh K. Srivastava

The period of performance for the above mentioned task was from 5/31/85 to 11/30/88. During this period the following was accomplished:

- 1) Nine papers were published in refereed journals. (A list is attached here).
- 2) Thirteen papers are either submitted to refereed journals or are under preparation. (A list is attached here).
- 3) Abstracts of five papers were presented in domestic and international conferences.
- 4) One united states patent was granted on an electron gun developed under the research sponsored by AFOSR.
- 5) One united states patent filed and is pending.
- 6) **Dissociative attachment and polar dissociation cross sections** were measured for the following molecules:
 - i) HCl (fig.1).
 - ii) NO (fig.2).
 - iii) N₂O (fig.3,4).
 - iv) C₆H₆ (fig.5).
 - v) SiH₄ (fig.6,7).
 - vi) Si₂H₆(fig.8,9).
 - vii) LiH (fig.10,11).
- 7) **Direct ionization and dissociative ionization cross sections** were determined for the following molecules:
 - i) H₂ (fig. 12,13).
 - ii) D₂ (fig. 14,15).
 - iii) N₂ (fig.16,17).
 - iv) O₂ (fig.18,19,20).
 - v) He (fig. 21).
 - vi) Ne (fig. 22,23,24).
 - vii) Ar (fig. 25,26,27).
 - viii) Kr (Fig. 28,29,30).
 - ix) Xe (Fig. 31,32,33).
 - x) H₂O (Fig. 34,35,36)
 - xi) CO (Fig. 37).
 - xii) CO₂ (fig. 38,39).



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xiii) CH_4 (fig. 40,41).

xiv) SiH_4 (fig. 42).

xv) Si_2H_6 (fig. 43,44).

xvi) N_2^* (fig. 45).

xvii) CH_3 (fig. 46).

8) An experimental apparatus for a pulsed extraction technique was fabricated and successfully tested.

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3. E. Krishnakumar and S. K. Srivastava, "Cross Sections for Positive Ion Production by Electron Impact on SiH_4 and Si_2H_6 ", under preparation.
4. E. Krishnakumar and S. K. Srivastava, "Ionization of O_2 by Electron Impact", under preparation.
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6. E. Krishnakumar, M. T. Bernius and S. K. Srivastava, "An Instrument for the Measurement of Dissociative Ionization and Attachment Cross Sections of Molecules by Electron Impact", under preparation.
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10. E. Krishnakumar and S. K. Srivastava, "Cross Sections for the Production of Positive Ions by Electron Impact on SiH_4 and Si_2H_6 ". To be published in *Phys. Rev. A*.
11. E. Krishnakumar and S. K. Srivastava, "Negative Ion Formation by Electron Impact on Si_2H_6 ". To be published in *Phys. Rev. A*.
12. S. K. Srivastava, "Negative and Positive Ions from LiH Vapor", under preparation.
13. S. K. Srivastava, "Ionization Fragments Generated by Electron Impact on C_6H_6 ", under preparation.

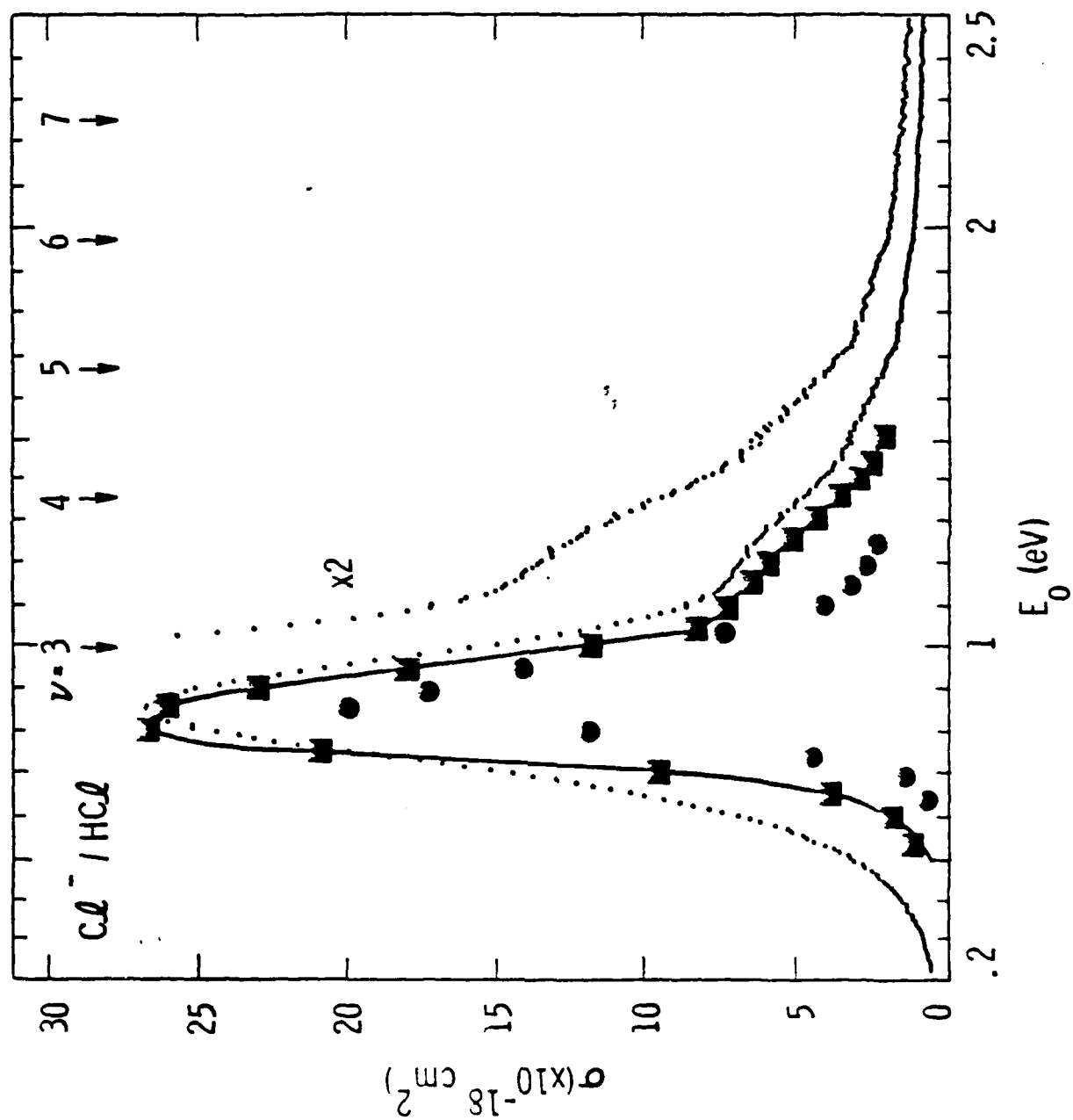
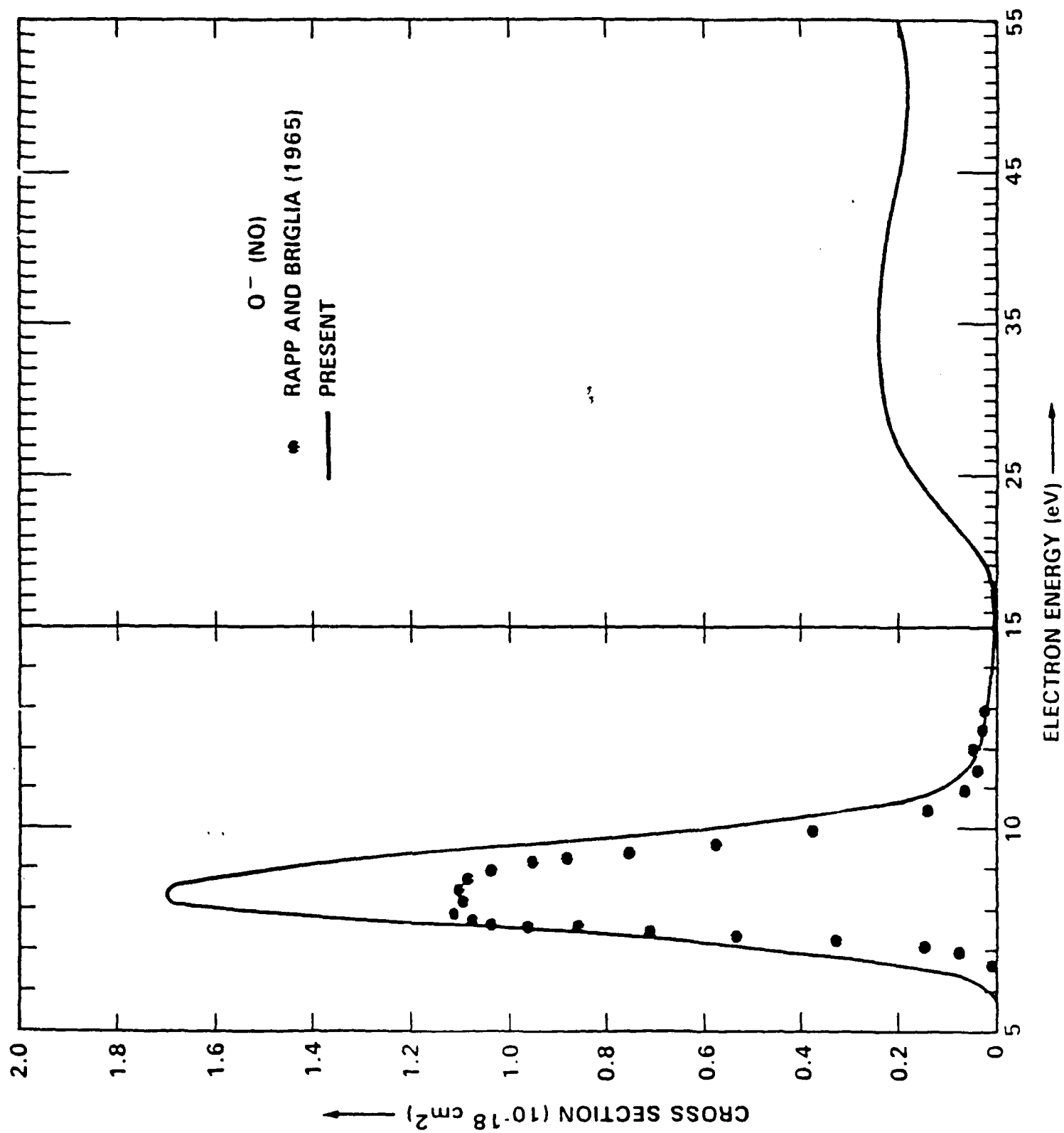
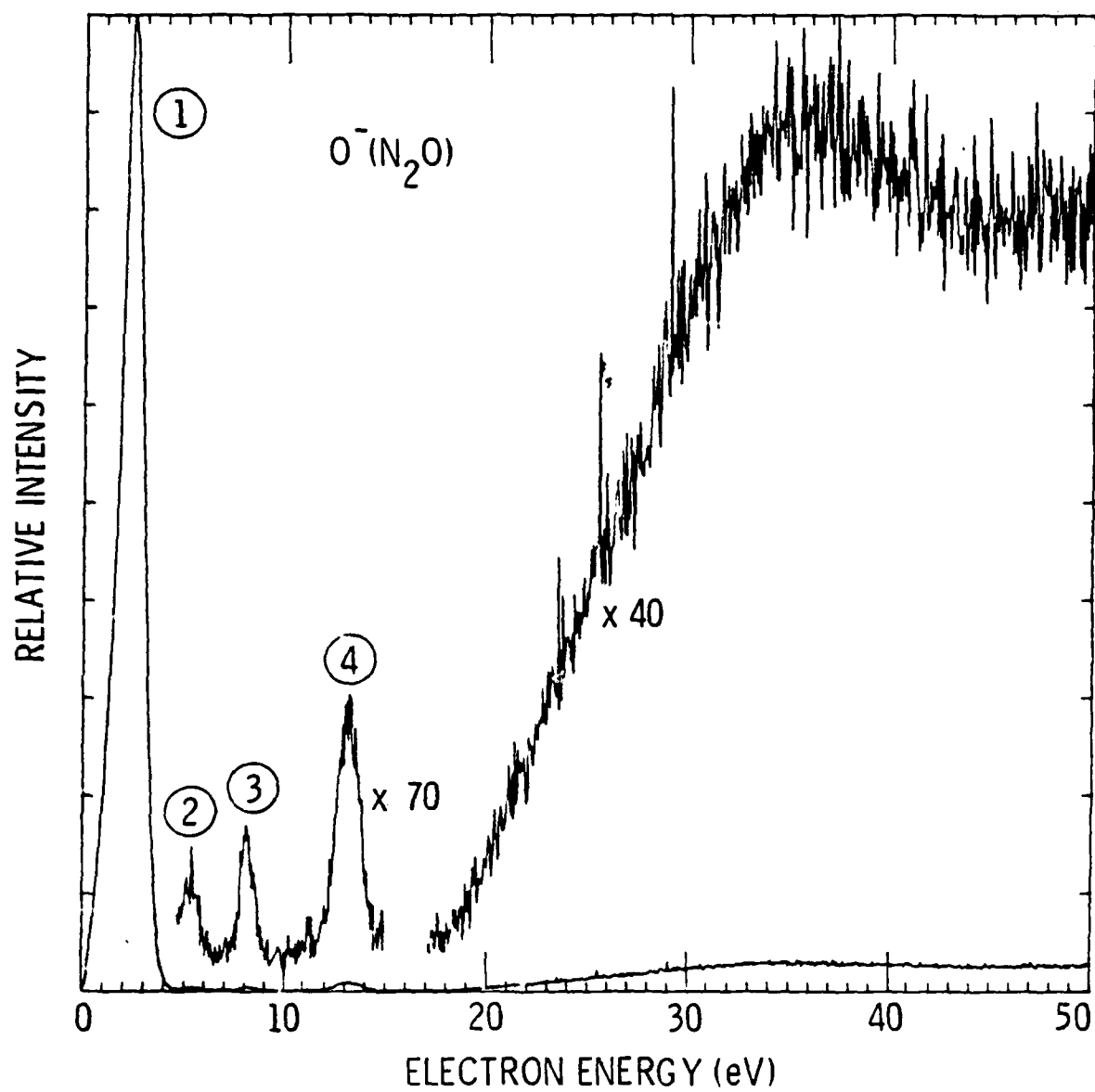
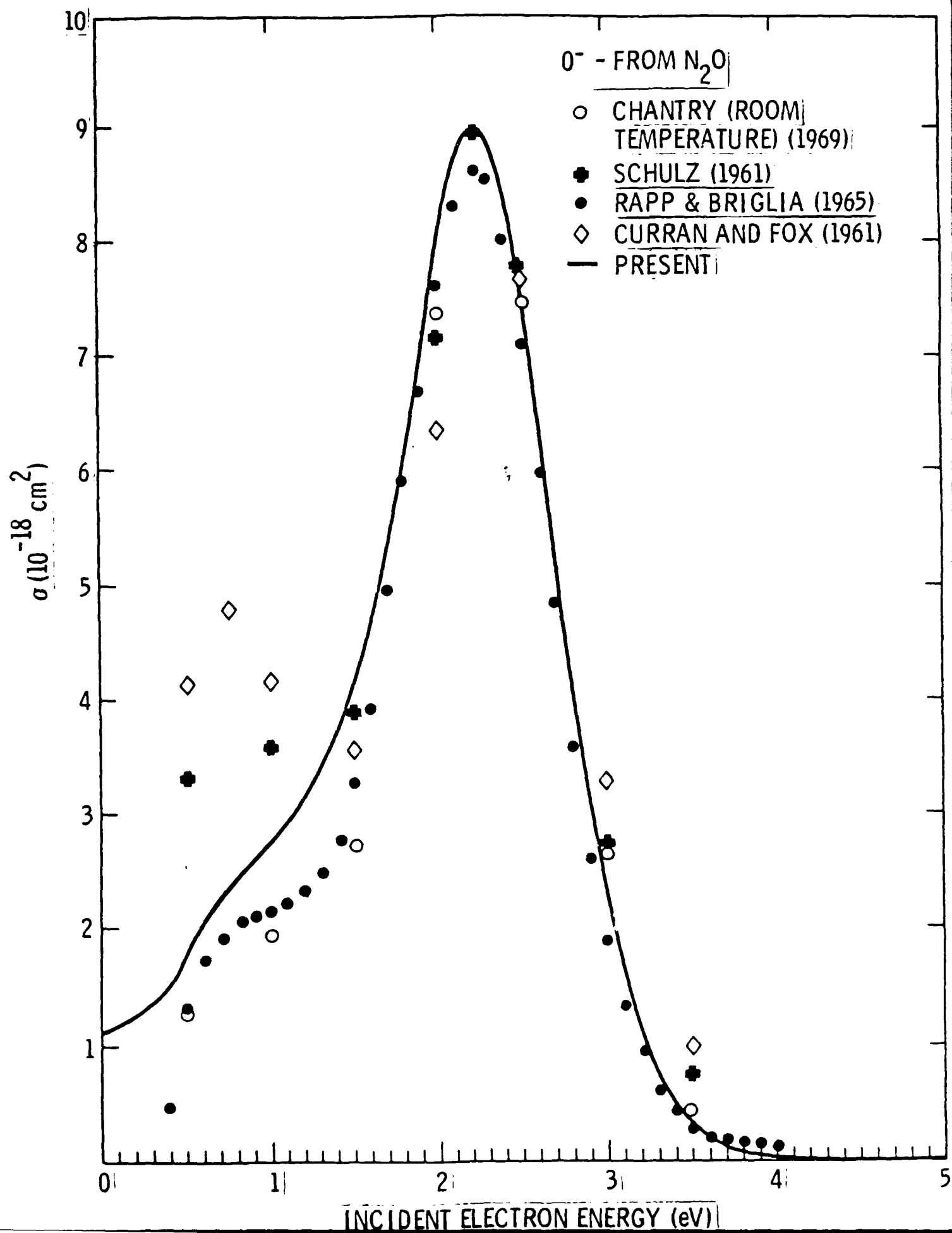
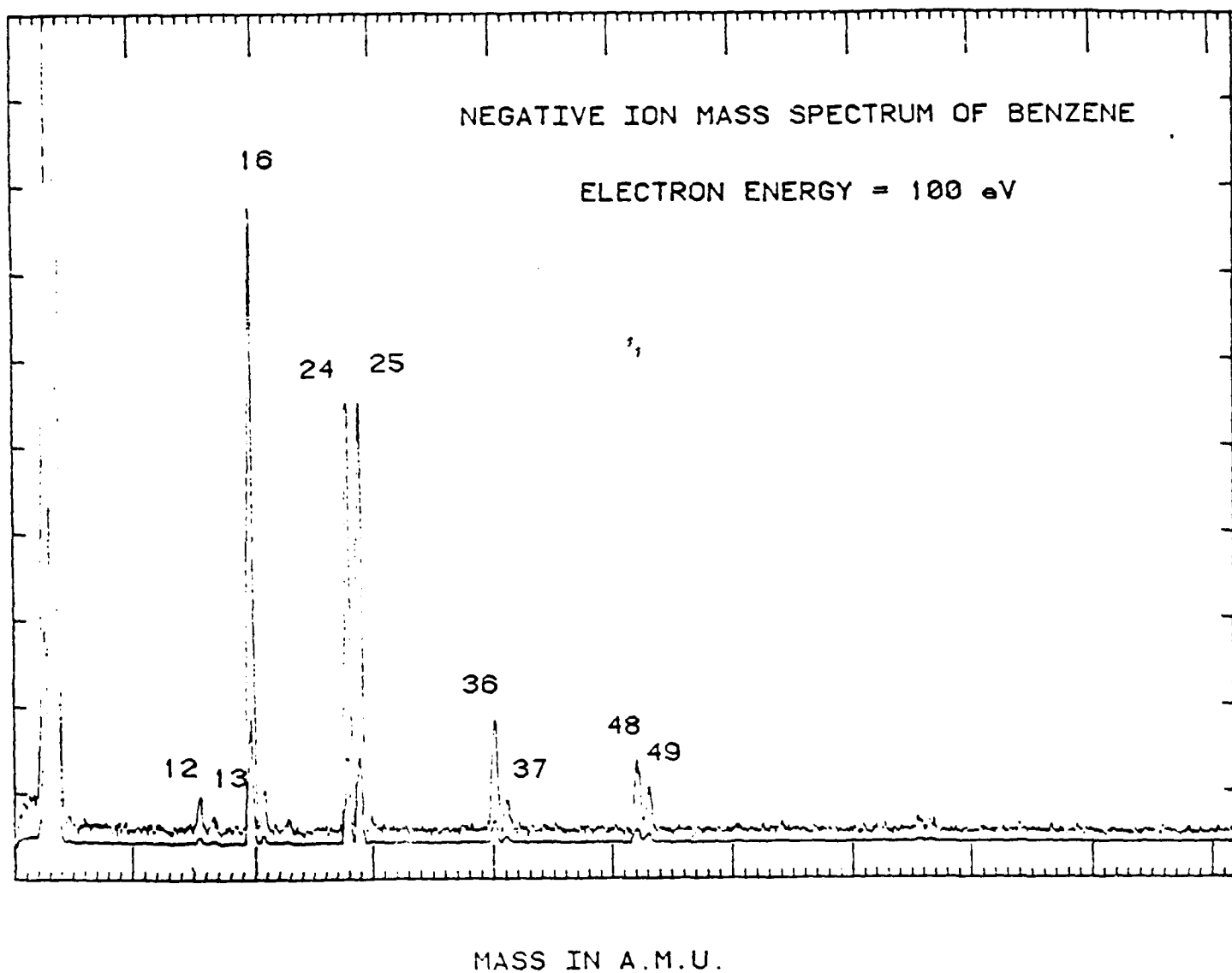


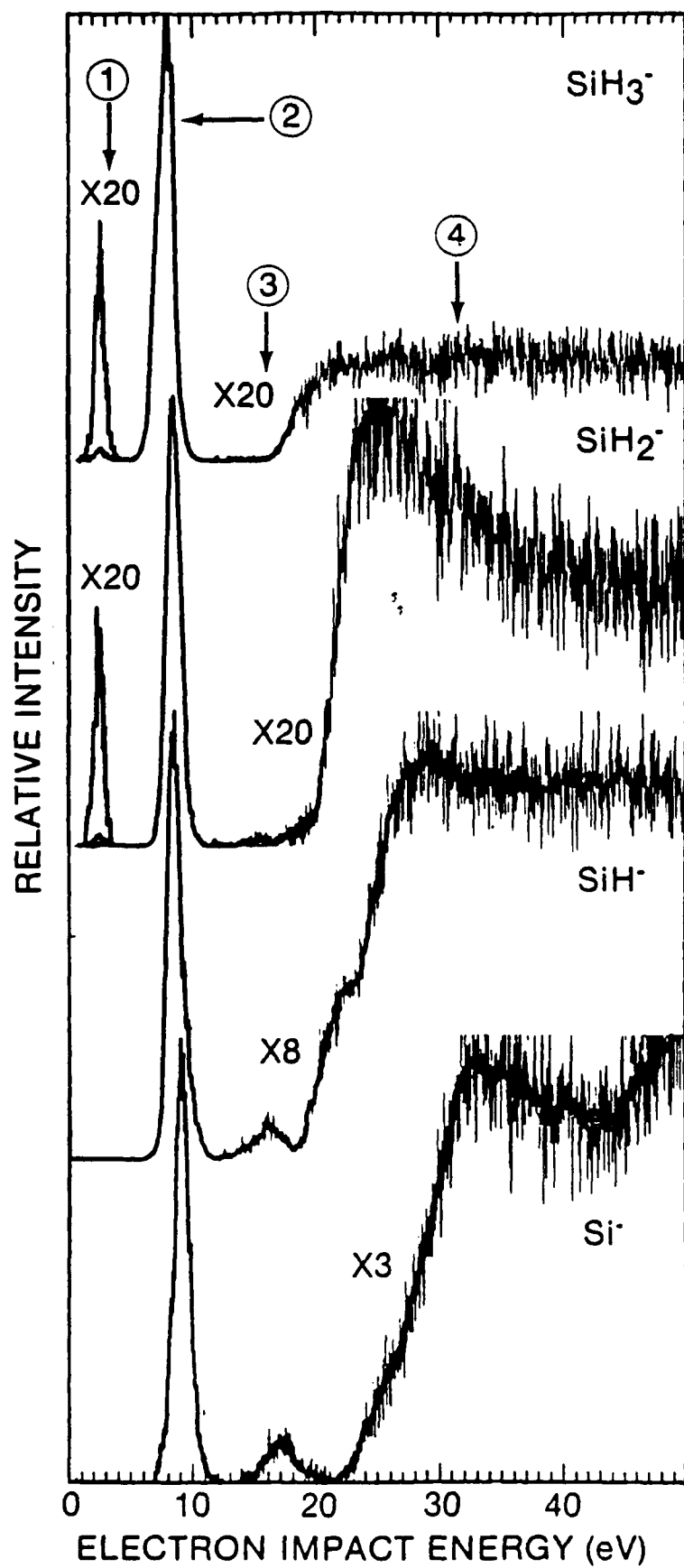
Figure 1. Dissociative electron attachment cross section for Cl^-/HCl as a function of the electron beam energy. The arrows indicate the position of the vibrational levels of the $\text{HCl } 1\Sigma^+$ ground state. (Allen and Hong, 1981).

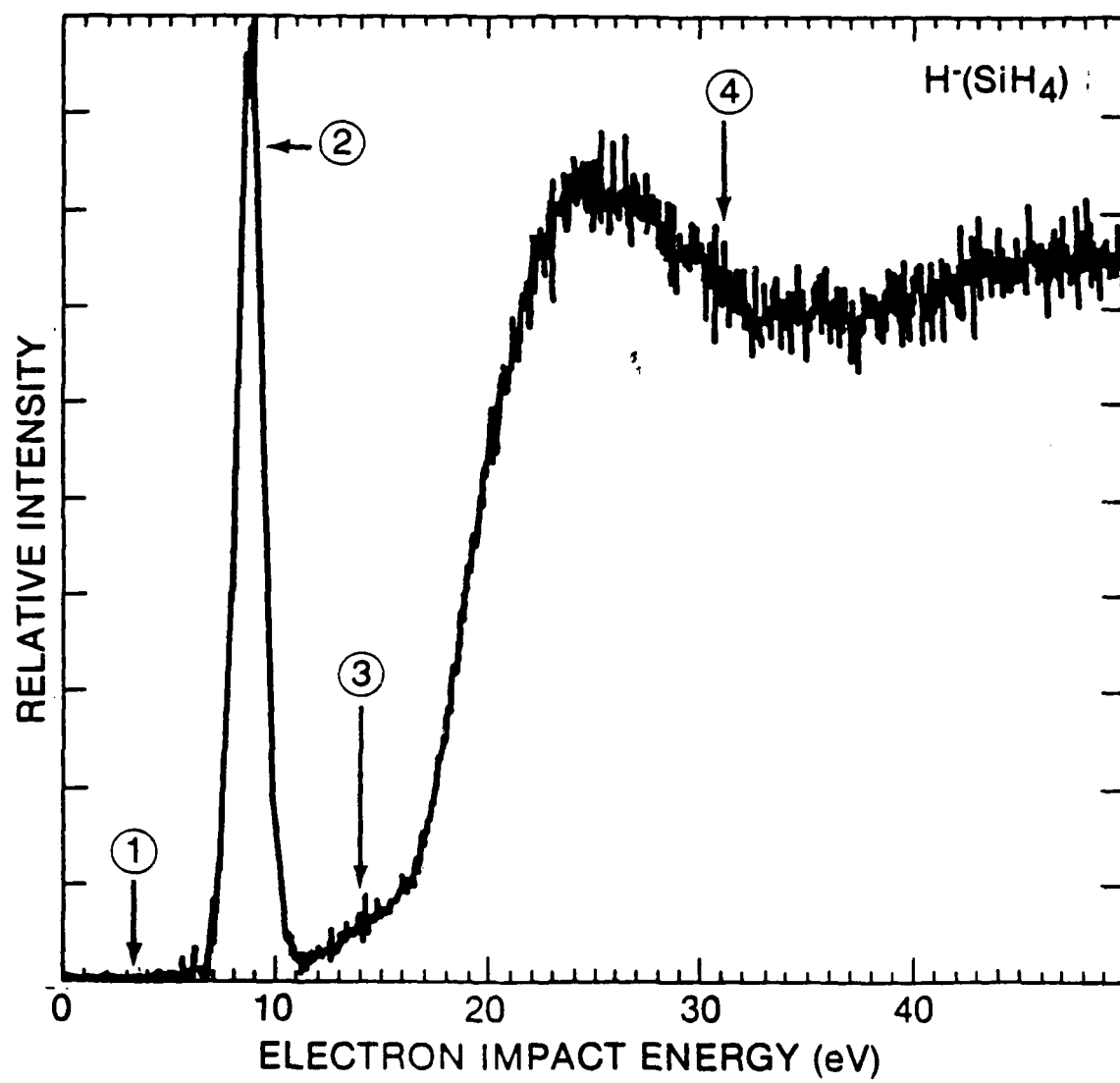


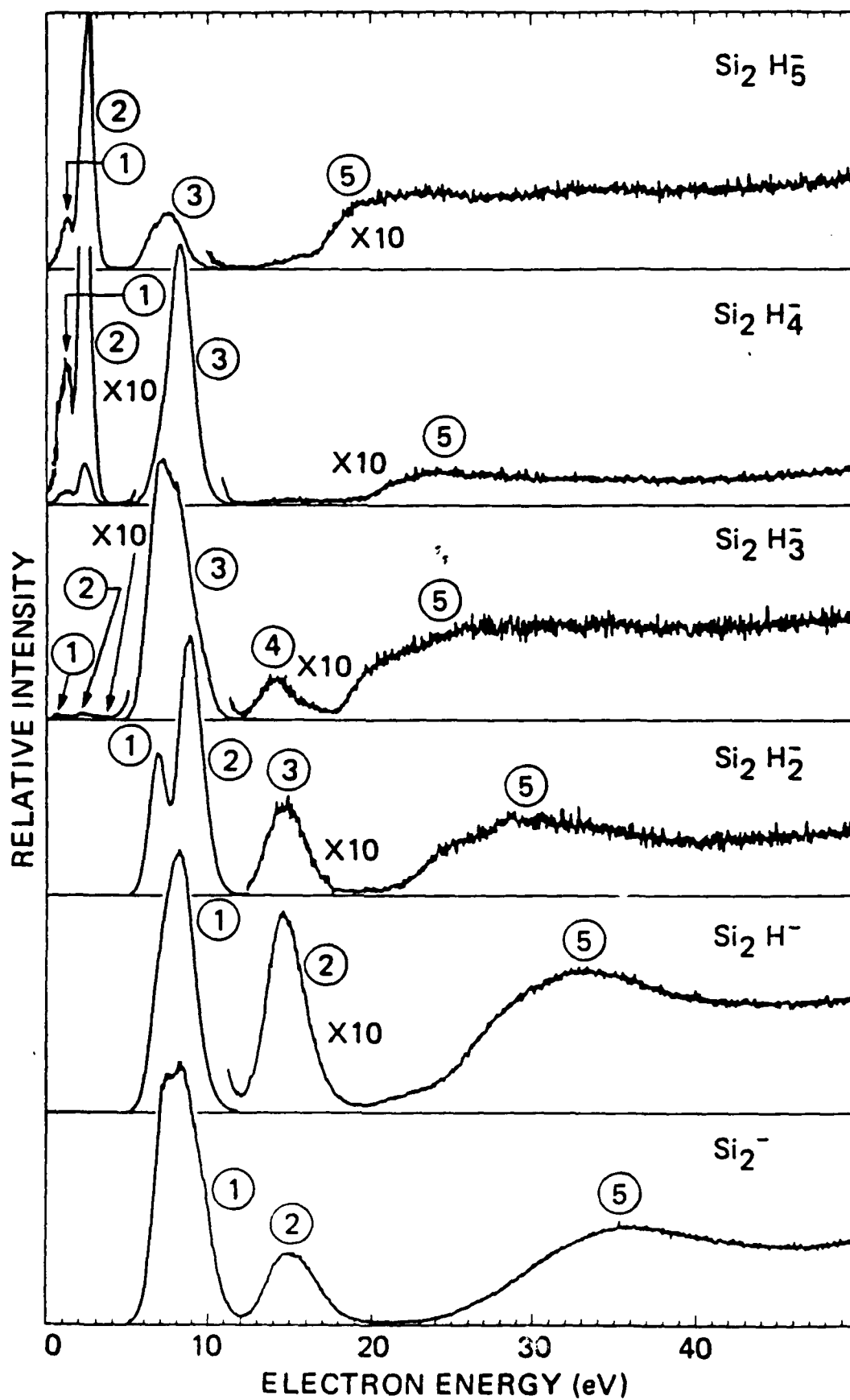


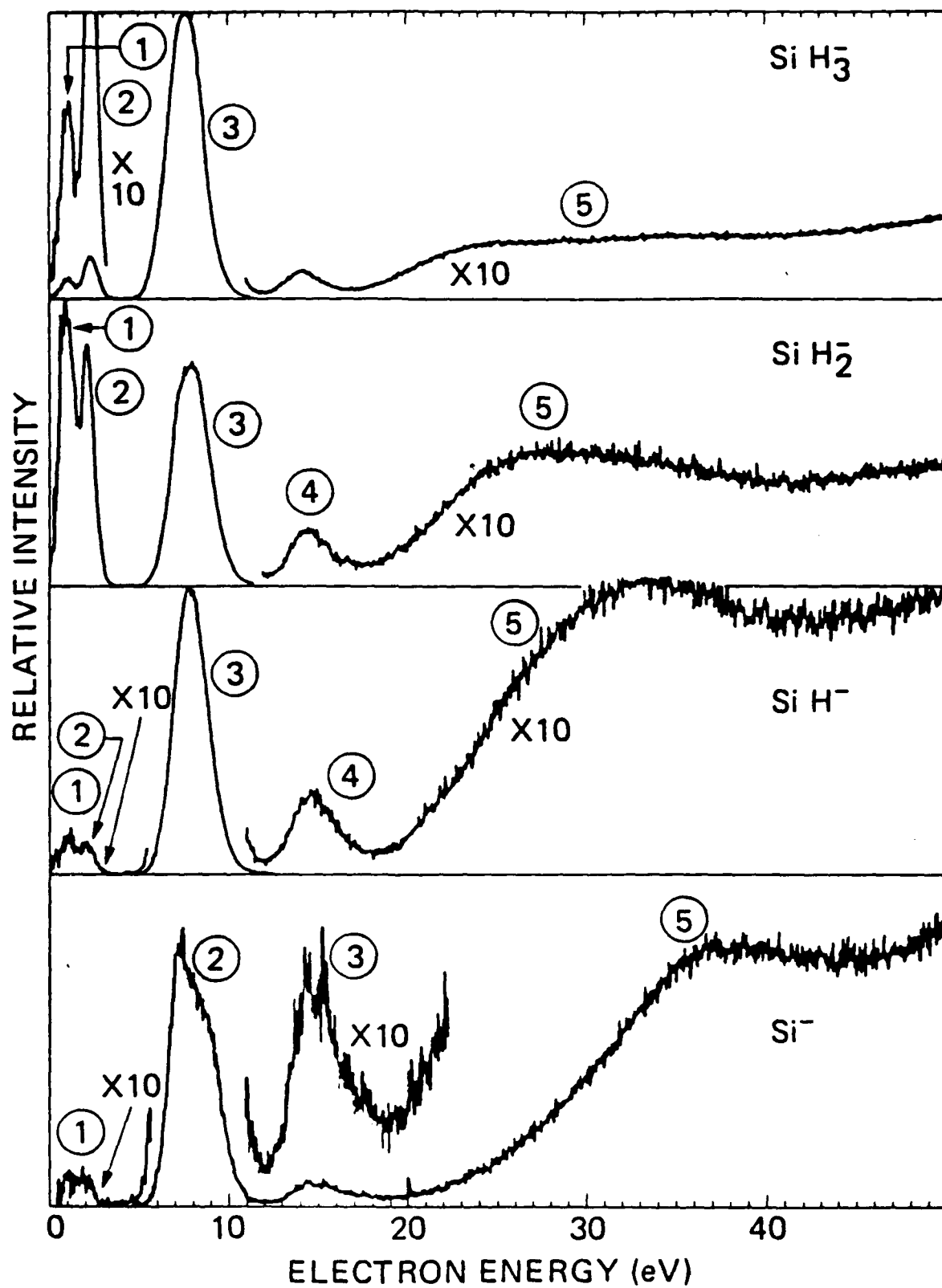




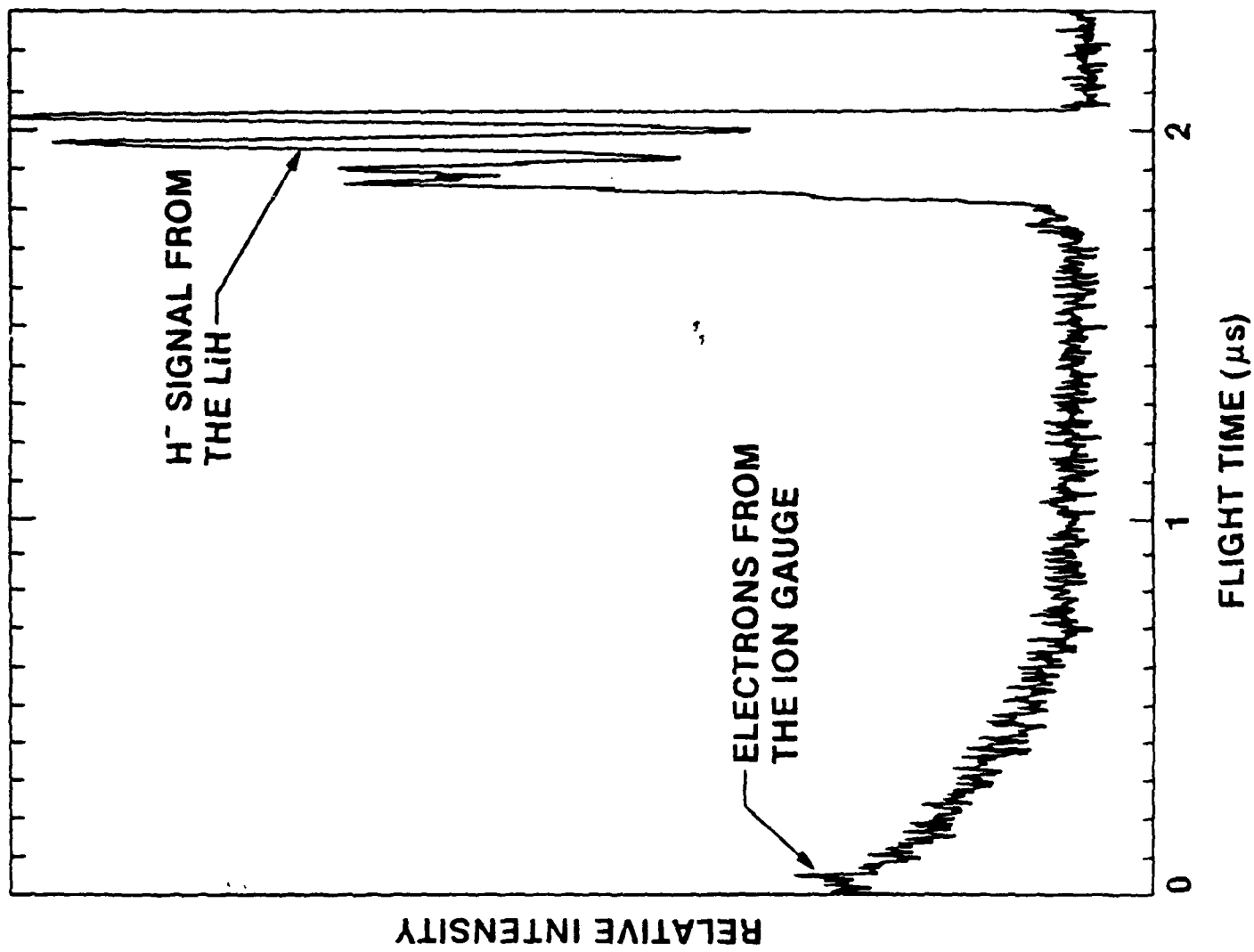








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